



Full Length Research Article

A STUDY ON THE IMPACT OF RESEARCH METHODOLOGY IN PH. D COURSE: An Overview:

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ABSTRACT

A research can lead to new contributions to the existing knowledge. Only through research is it possible to make progress in a field. Research is indeed civilization and determines the economic, social and political development of a nation. The results of scientific research very often force a change in the philosophical view of problems which extend far beyond the restricted domain of science itself. Research is not confined to science and technology only. There are vast areas of research in other disciplines such as languages, literature, history and sociology. Whatever might be the subject, research has to be an active, diligent and systematic process of inquiry in order to discover, interpret or revise facts, events, behaviours and theories. An attempt has been made to discover new facts and verify and test important facts and analyze an event or process or phenomenon to identify the cause and effect relationship. Moreover it develops new scientific tools, concepts and theories to solve and understand scientific and nonscientific problems.

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INTRODUCTION

Research is a logical and systematic search for new and useful information on a particular topic. In the well-known nursery rhyme:

- Twinkle Twinkle Little Star
- How I Wonder What You Are

The use of the words how and what essentially summarizes what research is. It is an investigation of finding solutions to scientific and social problems through objective and systematic analysis. It is a search for knowledge, that is, a discovery of hidden truths. Here knowledge means information about matters. The information might be collected from different sources like experience, human beings, books, journals, nature, etc. A research can lead to new contributions to the existing knowledge. Only through research is it possible to make progress in a field. Research is indeed civilization and determines the economic, social and political development of a nation. The results of scientific research very often force a change in the philosophical view of problems which extend far beyond the restricted domain of science itself. Research is not confined to science and technology only.

There are vast areas of research in other disciplines such as languages, literature, history and sociology. Whatever might be the subject, research has to be an active, diligent and systematic process of inquiry in order to discover, interpret or revise facts, events, behaviours and theories. Applying the outcome of research for the refinement of knowledge in other subjects, or in enhancing the quality of human life also becomes a kind of research and development. Research is done with the help of study, experiment, observation, analysis, comparison and reasoning. Research is in fact ubiquitous. For example, we know that cigarette smoking is injurious to health; heroine is addictive; cow dung is a useful source of biogas; malaria is due to the virus protozoan plasmodium; AIDS (Acquired Immuno Deficiency Syndrome) is due to the virus HIV (Human Immuno Deficiency Virus). How did we know all these? We became aware of all these information only through research. More precisely, it seeks predictions of events, explanations, relationships and theories for them.

As stated by Gerald Milburn Scientific research is a chaotic business, stumbling along amidst red herrings, errors and truly, creative insights. Great scientific breakthroughs are rarely the work of a single researchers plodding slowly by inexorably towards some final goal. The crucial idea behind the breakthrough may surface a number of times, in different places, only to sink again beneath the babble of an endless scientific discourse.

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Objectives of Research

The prime objectives of research are

- To discover new facts
- To verify and test important facts
- To analyze an event or process or phenomenon to identify the cause and effect relationship.
- To develop new scientific tools, concepts and theories to solve and understand scientific and nonscientific problems
- To find solutions to scientific, nonscientific and social problems and
- To overcome or solve the problems occurring in our everyday life.

Motivations Factors

- To get a research degree (Doctor of Philosophy (Ph.D.)) along with its benefits like better employment, promotion, increment in salary, etc.
- To get a research degree and then to get a teaching position in a college or university or become a scientist in a research institution
- To get a research position in countries like U.S.A., Canada, Germany, England, Japan, Australia, etc. and settle there
- To solve the unsolved and challenging problems
- To get joy of doing some creative work
- To acquire respectability
- To get recognition
- Curiosity to find out the unknown facts of an event
- Curiosity to find new things
- To serve the society by solving social problems.

Some students undertake research without any aim possibly because of not being able to think of anything else to do. Such students can also become good researchers by motivating themselves toward a respectable goal. As pointed out by Prof. Rajesh Kasturirangan (NIAS, IISc) even if you work in a company or run a company, a mind inclined towards research would do better than a mind not trained for it and it was like the story of the hare and the tortoise. If you have a mind trained for research, you will be the tortoise – the climb would be slow and steady, but eventually you would win the race.

Thesis Research

In the words of Prof. P. Balaram [Current Science, 87(2004)1319] Ph.D. degree is a passport to a research career. The Ph.D. period often influence a research scholar to make or to break in a scientific career. Here one reaches the frontier of knowledge and begins in earnest the lifelong task of learning how to do research. As pointed out by Beasley and Jones [1] during Ph.D. course ideally one learns how to pick a research problem, how to carry out it, how to extract new information from the results and how to publish the findings to the scientific Community. Thesis or Ph.D. research inherently involves those aspects of subject that cannot be actually learned from textbooks or from lecture courses. It is the point where the values, traditions and styles of science are transmitted from one generation to another.

Importance of Research

Research is important both in scientific and nonscientific fields. In our life new problems, events, phenomena and processes occur every day. Practically, implementable solutions and suggestions are required for tackling new problems that arise. Scientists have to undertake research on them and find their causes, solutions, explanations and applications. Precisely, research assists us to understand nature and natural phenomena.

Some important avenues of research are

- A research problem refers to a difficulty which a researcher or a scientific community or an industry or a government organization or a society experiences. It may be a theoretical or a practical situation. It calls for a thorough understanding and possible solution.
- Research on existing theories and concepts help us identify the range and applications of them.
- It is the fountain of knowledge and provide guidelines for solving problems.
- Research provides basis for many government policies. For example, research on the needs and desires of the people and on the availability of revenues to meet the needs helps a government to prepare a budget.
- It is important in industry and business for higher gain and productivity and to improve the quality of products.
- Mathematical and logical research on business and industry optimizes the problems in them.
- It leads to the identification and characterization of new materials, new living things, new stars, etc.
- Only through research inventions can be made; for example, new and novel phenomena and processes such as superconductivity and cloning have been discovered only through research.
- Social research helps find answers to social problems. They explain social phenomena and seek solution to social problems.
- Research leads to a new style of life and makes it delightful and glorious. Emphasizing the importance of research Louis Pasteur said: I beseech you to take interest in these sacred domains called laboratories. Ask that there be more and that they be adorned for these are the temples of the future, wealth and well-being. It is here that humanity will learn to read progress and individual harmony in the works of nature, while humanity's own works are all too often those of barbarism, fanaticism and destruction. (Louis Paster – article by S. Mahanti, Dream 2047, p.29–34 (May 2003)). In order to know what it means to do research one may read scientific autobiographies like Richard Feynmann's Surely you are joking, Mr.Feynmann! , Jim Watson's The double helix and Science as a way of life – A biography of C.N.R. Rao by Mohan Sundararajan.

MATERIALS AND METHODS

- **Research methods** are the various procedures, schemes and algorithms used in research. All the methods used by a researcher during a research study are termed as research methods. They are essentially planned, scientific and

value-neutral. They include theoretical procedures, experimental studies, numerical schemes, statistical approaches, etc. Research methods help us collect samples, data and find a solution to a problem. Particularly, scientific research methods call for explanations based on collected facts, measurements and observations and not on reasoning alone. They accept only those explanations which can be verified by experiments.

- **Research methodology** is a systematic way to solve a problem. It is a science of studying how research is to be carried out. Essentially, the procedures by which researchers go about their work of describing, explaining and predicting phenomena are called research methodology. It is also defined as the study of methods by which knowledge is gained. Its aim is to give the work plan of research.

Various Stages of a Research

Whenever a scientific problem is to be solved there are several important steps to follow.

The problem must be stated clearly, including any simplifying assumptions. Then develop a mathematical statement of the problem. This process may involve use of one or more mathematical procedures. Frequently, more advanced text books or review articles will be needed to learn about the techniques and procedures. Next, the results have to be interpreted to arrive at a decision. This will require experience and an understanding of the situation in which the problem is embedded. A general set of sequential components of research is the following:

1. Selection of a research topic
2. Definition of a research problem
3. Literature survey and reference collection
4. Assessment of current status of the topic chosen
5. Formulation of hypotheses
6. Research design
7. Actual investigation
8. Data analysis
9. Interpretation of result
10. Report.

The Attributes of a Research Scholar

Any researcher should be motivated by a noble goal. Work gets the first, second and third priority. The attributes of a good research scholar may be summarized as:

- Self-confidence
- Dedication
- Concentration
- Determination
- Analytical mind
- Scientific discipline
- Global outlook
- Innovative approach
- Originality
- Intellectual curiosity
- Freedom from the obsessions of clock and calendar
- Flexibility

- Keen observation
- Intelligence
- Passion for knowledge
- Questioning attitude
- Spirit of enquiry • Insight
- Precision and accuracy
- Resilience to withstand temporary setbacks
- Persistence
- Patience
- Social skills
- Presentation skills
- Writing skills.

Conclusion

At the end of each chapter (except in the introductory chapter(s)), one can place a brief summary of the outcome of the work presented in that chapter under the heading conclusion. They should be clear and precise. The relevant questions which are still not answered and new questions raised by the work of the present chapter have to be mentioned. Whether the answers to the questions are obtained or not, if obtained in which chapter(s) they are presented should be specified. Mention possible future research. It is important to make a connection between two consecutive chapters either at the end of the first or at the beginning of the second. Chapters should not look like reports of isolated work. There should be a link between consecutive chapters and the link should be clearly brought out.

C. End Matters

The end part of the report generally consists of references, appendices, computer programs (if they are not easy to develop) and copies of research publications that came out from the research work done

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